

Extreme conditioning programs and the tactical athlete

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Extreme Conditioning Programs and the tactical athlete

DR Rob Orr





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BLUF: Extreme Conditioning Programs have a time and place but are not the only time and place and the potential use must be considered against safer and potentially more effective ways of obtaining desired tactical conditioning

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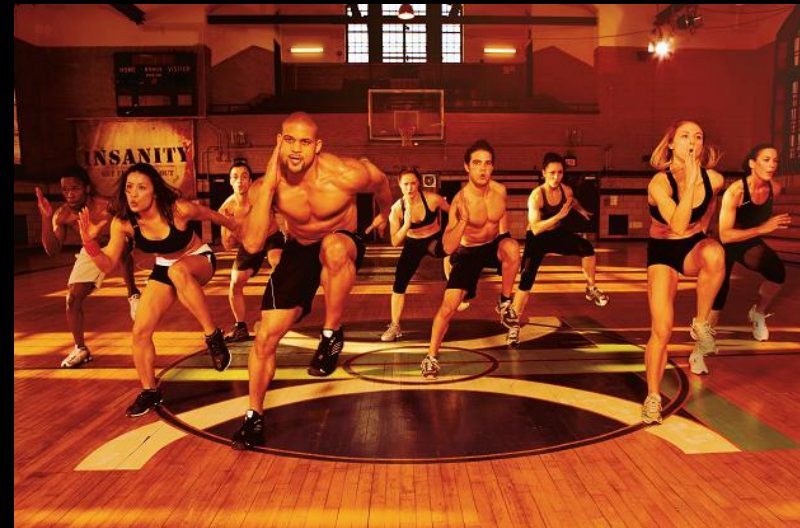


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What are ECPs?

‘ECPs are characterised by high-volume aggressive training workouts that use a variety of high intensity exercises and often timed maximal number of repetitions with short rest periods between sets’

Bergeron et al (2011), p.383



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Cult like status – esp communal ones



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Cult like status – esp communal ones



CROSSFIT

Fuck form!

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Cult like status – esp communal ones



ZUMBA

I don't think so bitch

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What is CrossFit?

**A fitness company based in Washington, District Of Columbia.
founded by Greg Glassman in 2000**

CrossFit, Inc.

- **Licenses the CrossFit name to gyms for an annual fee and**
- **Provides specific training to certify trainers.**

**CrossFit makes use of a virtual community Internet model
interacting through specific social media**



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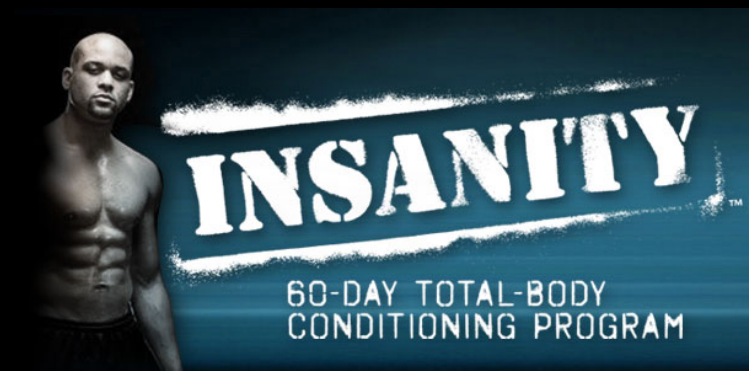
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What is Shaun T?

Is a Commercial home exercise regime promising results in 60 days (or only training 25 mins a day)

Max interval training 3-4 minutes high intensity work followed by 30 seconds of recovery

A product of Beachbody LLC, an American multinational corporation that uses multi-platform marketing to sell fitness, weight loss, and muscle building home-exercise



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What is P90x?

Tony Horton's P90x is a commercial home exercise regime promising results in 90 days

A product of Beachbody LLC, an American multinational corporation that uses multi-platform marketing to sell fitness, weight loss, and muscle building home-exercise



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- Do these programs work?
 - Are they effective?
 - Are they safe?
- Are they better than the current traditional methodologies?

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Some of the claims: CrossFit

Evidence-Based Fitness

By Greg Glassman

In this excerpt from one of his talks at a recent CrossFit certification seminar, founder Greg Glassman discusses the methods and rationale of CrossFit. Fundamentally, what we are about, he explains, is evidence-based fitness. Here he breaks that claim down into its constituent parts and explains the logical, scientific basis of the CrossFit system for advancing human performance. To evaluate any such system, there are three key elements that must be assessed:

- 1) Safety: the program's record for injury avoidance-- and prevention.
- 2) Efficacy: its results, or the adaptations it produces.
- 3) Efficiency: how long it takes to achieve those adaptations.

"If you find the notion of falling off rings and breaking your neck so foreign to you, then we don't want you in our ranks"

"It can kill you. I've always been completely honest about that"

Glassman cited by Cooperman (2005)

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Some of the claims: CrossFit

Evidence-Based Fitness

By Greg Glassman

For a fitness program to have meaning, those three elements must be supported by measurable, observable, repeatable data. Moreover, its methods, outputs, and criticisms must be transparent, or available for anyone to see and evaluate. These are the fundamental bases of scientific inquiry and of rational argument and evaluation, and (despite the unempirical, profit-driven nature of so much of the silliness that pervades the fitness industry), they are necessarily the requirements of any fitness program that claims to make you fitter.

Glassman, G. (2007).

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What is Evidence Based?

EBP is informed by:

- HIGH QUALITY research
- Professional knowledge and reasoning
- Knowledge derived from various sources

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Evidence?

Quality of Evidence: Testimonials

... I have always found it challenging to make time for more than one form of fitness training. Crossfit XXXXX was a revelation for me: a single hour-long workout to address cardio, strength, flexibility, etc. I feel more generally fit than I have in a long time, I have lost 8kg of fat, and I am writing this while wearing a suit I have not fitted into in 5 years. Do yourself a favour – give it a try.

— Alan

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Evidence?

Quality of Evidence: Testimonials

I am currently on Day 11 of Insanity and I feel like my upper body looks more toned.

— Jodi

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Evidence?

Quality of Evidence: Before and After



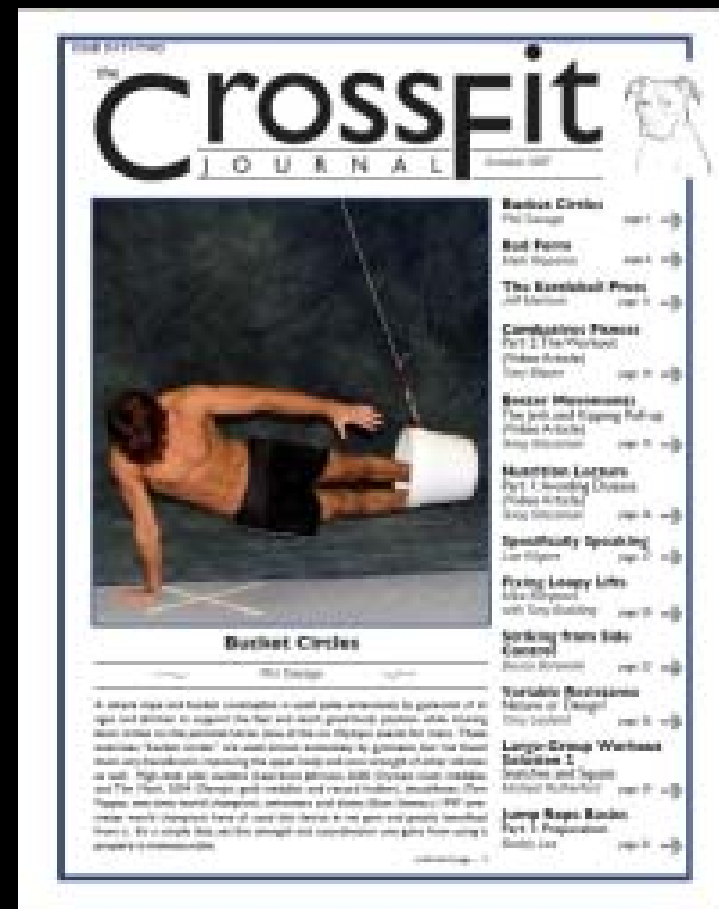
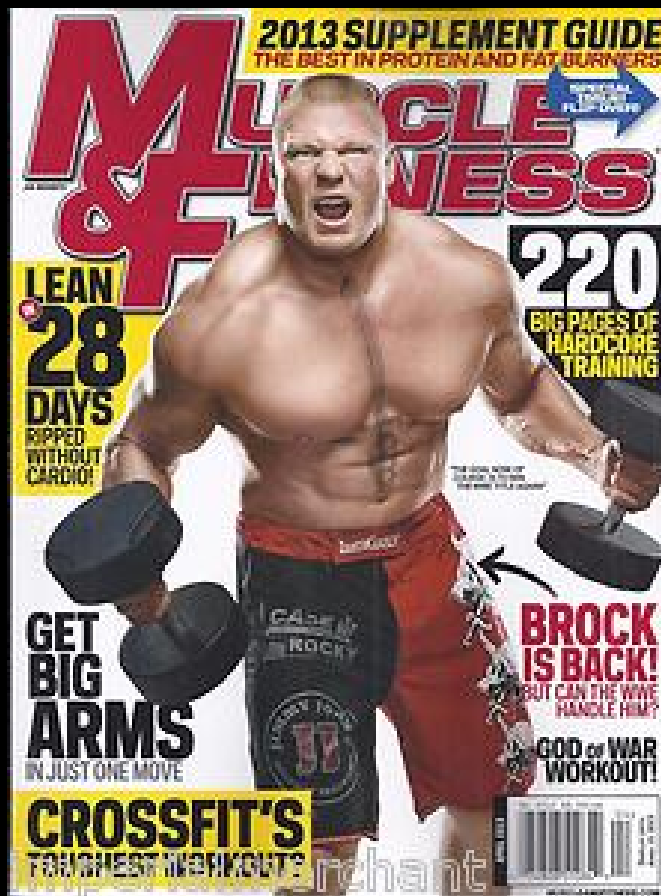
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Evidence?

Quality of Evidence: Literature (Bias?)



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Literature Search

Quality of Evidence: Literature

Literature Search of Peer Reviewed Literature:

Terms: CrossFit, P90x, Gym Jones, Shaun T,
'Extreme Conditioning'

Results:

- 3 Journal Articles, 4 Defence Papers, 5 Abstracts
 - o 7 Studies
 - o 5 Discussion Papers

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Abstract

Evaluation of Muscular Endurance, Agility and Flexibility in Healthy Trained CrossFit and Weight Trained Individuals

Schafer, et al. (2013).

Subjects:

Males - CF=9: WT=7

Method:

3-6 sessions / week min of 6/12

O/E: Push Up, Chin Up, T Test, Sit and Reach

Results/Conclusion:

XFit significantly more Chins than WT (Type of Chins?)

No other significant differences



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Abstract

Energy Expenditure of a High Intensity Cross Fit workout compared to a traditional Aerobic Workout

McKenzie & Pulliam (2013).

Subjects:

Males=10 : Females=9 (trained)

Method:

30 mins Run @70% VO₂max / 12 Min XFit workout

Results/Conclusion:

TOTAL EE higher in Run Group

High EE on a per min basis in XFIT

XFIT worked harder based on HR, RPE and VO₂



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Abstract

CrossFit vs Resistance-Trained Individuals: Evaluation of Strength and Power

Arnett, et al. (2013).

Subjects:

Males - CF=9: WT=7

Method:

3-6 sessions / week min of 6/12

**O/E: 1RM Bench Press, 1 RM Squat, Med ball shot put,
Vertical jump and Margaria-Kalamen Test**

Results/Conclusion:

No other significant differences



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Abstract

Comparison of Aerobic and Anaerobic Power in CrossFit and Weight Trained Individuals

Sobrero, et al. (2013).

Subjects:

Males - CF=8: WT=6

Method:

3-6 sessions / week min of 6/12

O/E: Aerobic (Bruce Treadmill) and Anaerobic (Wingate Anaerobic) Power

Results/Conclusion:

No other significant differences between CF and WT in Aerobic and Anaerobic Power



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Abstract

Metabolic and Cardiovascular Demands of a Named CrossFit workout “Cindy”

Kluszczewicz, et al. (2013).

Subjects:

Males=10 : Females=9 (3 months training)

Method:

Completed “Cindy”

5 Chin ups, 10 Push Ups, 15 Air Squats for 20 mins

O/E: VO₂; HR; Kcal.min⁻¹

Results/Conclusion:

Ave 68% VO₂max, 170.8 bpm, 260.6 Kcal total

ASCM Classify Vigorous Activity as between 64-90% VO₂max



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Command and General Staff College Study

Cross Fit Study

MAJ Paine, et al. (2010).

Subjects:

Males=9 : Females=5 (3 Unit-Nil; Mod-Nil, Fit-Nil to Exp)

Method:

Completed 6 Weeks (min 4, max 5 XFIT sessions)

APFT (Push Ups, Sit Ups and 2mi Run) + XFIT measures
(% Average Power)

Results/Conclusion:

Push ups: ave ↑ 7.3% (4.6: 20-107): 2 (14%) ↓

Sit Ups: ave ↑ 4.8 (3.9: 50-110): several ↓

2mi Run ?



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Command and General Staff College Study

Cross Fit Study

MAJ Paine, et al. (2010).

- Limitations of this paper:
 - Small sample sizes
 - Missing data (2mi Run)
 - No control group
 - No alternate group for comparison (why is this better?)
 - Does not account for general adaptation syndrome to new stimulus (71% none to some Xp)
 - NO statistical analysis

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Journal Article

Crossfit-based high intensity power training improves maximal aerobic fitness and body composition

Subjects: **Smith, et al. (2013).**

Started: 54 male/female participants

Finished: 45 (83%) participants, Male=23:Female=20

'Injured'? from non-completers: 9 (17%)

Method:

CrossFit styled? Sessions for 10 weeks

Vo2max and % Body Fat (plethysmography)

Paleo diet

Results/Conclusion:

↑ in Vo2 / ↓ % Body fat

Males: 43.1 to 48.96 ml.kg.min/ 22.2 to 18.0%

Females: 35.98 to 40.22 ml.kg.min/ 26.6 to 23.2%

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TACTICAL STRENGTH & CONDITIONING AUSTRALIA

Journal Article

**Crossfit-based high intensity power training improves
maximal aerobic fitness and body composition**

Smith, et al. (2013).

- Limitations of this paper:
 - Insufficient detail on training parameters (CrossFit training parameters) – Fig 1 and Table 6 data?
 - Did not define 'Injured'
 - No control group
 - No alternate group for comparison (why is this better?)
 - Also on paleo diet

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Research Evidence Summary

- **Currently** no evidence to show ECP method superior to any other training method
- ECPs **do not appear** to represent training programs likely to improve operational tactical ability
- **There is evidence** to support the use of traditional training methods in a tactical population.

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Safety?

- Physicians and primary care and rehab providers have identified a potential disproportionate risk of musculoskeletal injury – esp for novices
- While some literature may suggest a higher incidence of injury from ECPs there is not yet sufficient evidence to make this claim definitive
- ANY training regime (even going for a run) can lead to injuries if performed incorrectly

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Safety?

A photograph showing a person on a trampoline. The person is in the air, and their arm is extended. The background is a blurred outdoor setting with trees and a blue sky.

Tough lesson: Leila Mayoh, 3, broke her arm while playing on the trampoline.
Picture: Tim Hunter

CrossFit gym craze running up injury toll

KATHLEEN DONAGHEY

IT'S the latest extreme fitness "cult" turning couch potatoes into hardcore machines.

Devotees of CrossFit call themselves the fittest people on Earth as they powerlift huge weights, swing kettle bells and climb ropes.

But some experts warn the high intensity exercise craze, which began with the military elite and moved into the suburbs, is causing serious injury.

Fitness guru and celebrity trainer Lee Campbell said CrossFit was "injury-plagued" as ordinary people pushed themselves to the limit.

Mr Campbell, who has worked as an army trainer, said there was an alarming trend towards shoulder injuries, with some requiring reconstructive surgery.

The toll, which "is getting bigger each day", extended to hips, knees and backs because of poor technique and lack of supervision.

"We stopped it (this style of training) in the army in the '90s because of the injury toll," said Mr Lee, from reality TV shows *Celebrity Overhaul* and *Big Extreme Makeover*.

Physiotherapists also have noted a "high" injury rate and

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Safety?

Compo awarded for 'jumping squat' knee injury

By [Ewan Gilbert](#)

Updated Tue 17 Sep 2013, 5:14pm AEST

A Canberra man has been awarded compensation of more than \$250,000 after he hurt his knee during an exercise class.

MAP: [ACT](#)



In 2005, Geoffrey Walker, 56, enrolled in a personal training course at the Canberra Institute of Technology (CIT).

As part of the course, he was asked to perform "jumping squats", which involve crouching and then jumping up and down.

It was an exercise that the class's own textbook warned was risky and designed for elite athletes.

Mr Walker said during the exercise he felt a crunching in his left knee, that left him with long-term pain and eventually required surgery.

Mr Walker took CIT to court, blaming them for breaching their duty of care by making him perform the dangerous routine.

But CIT said Mr Walker should have expected to engage in tough exercises and that he had signed a waiver for any injuries suffered.

The ACT Supreme Court found that despite Mr Walker having signed an indemnity form, he was still entitled to sue for damages.

Topics: [courts-and-trials](#), [act](#), [canberra-2600](#)

First posted Tue 17 Sep 2013, 4:17pm AEST

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Safety?

Manila Bulletin

May 20, 2010

ACC-NO: 226818806

LENGTH: 234 words

HEADLINE: Heat stroke claims life of Army recruit during fitness tests;
Main News

BODY:

An **Army** recruit died of heatstroke while 16 others were hospitalized for exhaustion and dehydration while undergoing fitness tests Wednesday in what weather experts said was one of the hottest days of the year.

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Lack of periodisation

- If all sessions are maximum intensity (AFAP/AMAP) how can volume and intensity be manipulated and the process of periodisation applied.
- Periodisation has been found to be effective at increasing performance in athletes (Sountatoulin, et al; 2003), and military personnel (Orr, 2010) and is recommended by the ASCM...

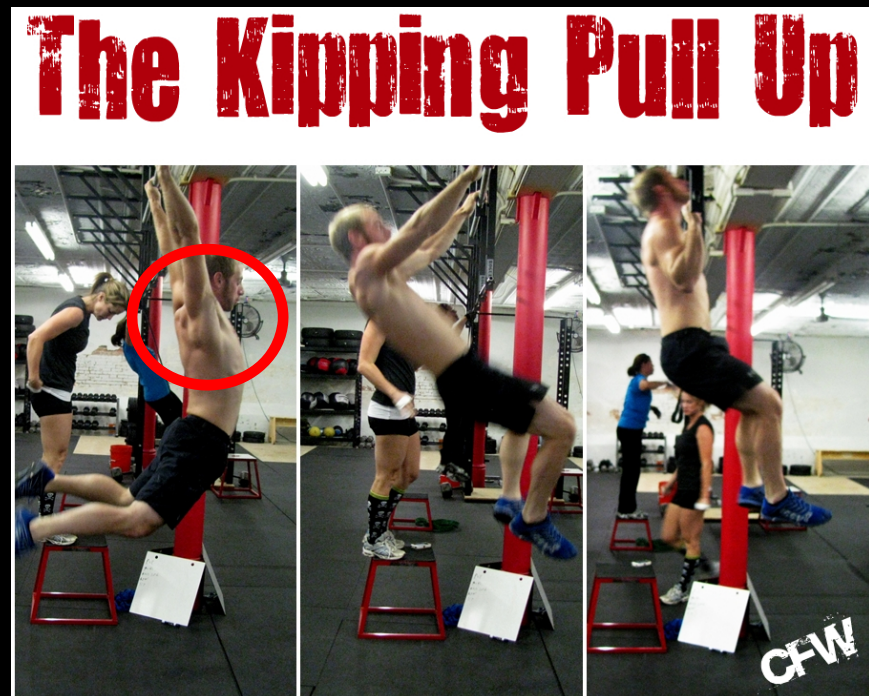
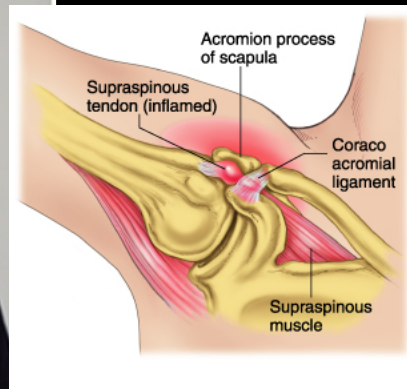
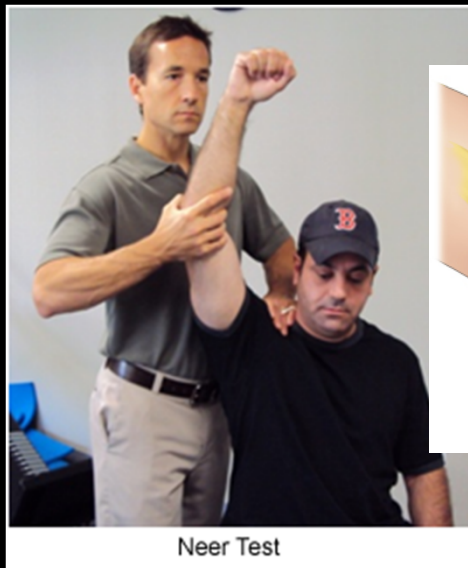
'It has been shown that systematic variation in volume and intensity is most effective for long-term progression' (ACSM, 2009, p.688)



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Logic for exercise choices/order?

- Concern regarding impingement
- NOTE: These concerns can also occur in other training platforms – Rotator Press in Body Pump as an example



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- How many repetitions with potentially harmful technique?

[v] The muscle-up is the brass ring for CrossFitters. It can take a year or more of plugging away to get them, and muscle-up attempts—especially when friends are going after them for the first time—are some of the most nail-biting moments in the gym. There's no joy for a CrossFitter like getting it:



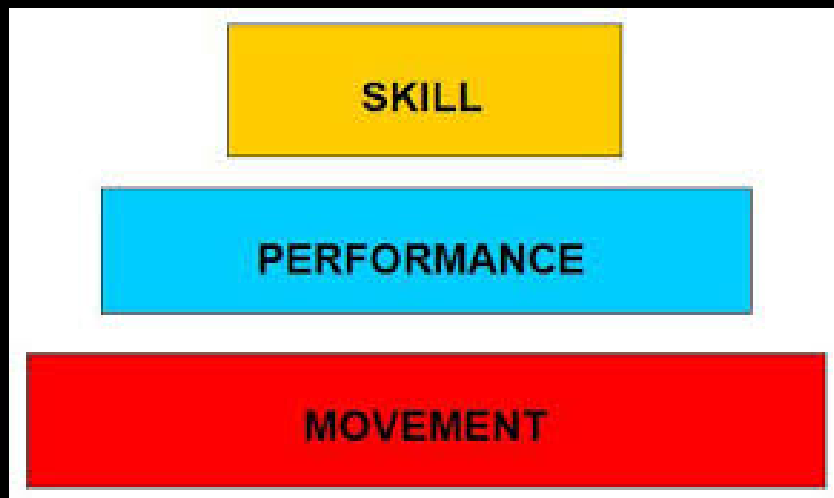
http://www.salon.com/2013/09/08/crossfit_nation_partner/

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Logic for exercise choices/order?



- The potential for injury is higher when the performance requirement is greater than the movement ability (eg at the joint)

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Logic for exercise choices/order?

- Many WODs defy evidence based research for exercise order and rest and recovery.

A snatch is an explosive exercise designed to train power development. 30 Reps is endurance. You do not use an explosive exercise to train endurance; there are more effective and safer choices...

...It is just random; it makes no sense

Cosgrove, A cited by Knipscher (2010)



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Logic for exercise choices/order?

SATURDAY 130921

Five rounds of:

100 meter Sprint
Clean & jerk, 1 rep
Max reps Muscle-up

MONDAY 130923

For time:

45 pound barbell Overhead squat, 50 reps
100 Abmat sit-ups
115 pound Overhead squat, 25 reps
50 Toes-to-bar
185 pound Overhead squat, 10 reps
20 GHD sit-ups

SUNDAY 130922

Three rounds of: "Fight Gone Bad!"

-Wall-ball, 20 pound ball, 10 ft target (Reps)
-Sumo deadlift high-pull, 75 pounds (Reps)
-Box Jump, 20" box (Reps)
-Push-press, 75 pounds (Reps)
-Row (Calories)

In this workout you move from each of five stations after a minute. The clock does not reset or stop between exercises.

- Leg load?

Evidence supported recommended recovery for muscle after loading?

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Logic for exercise choices/order?

- While exceptional in general purpose fitness and its ability to provide challenging, primalistic workouts soldiers enjoy, ECPs fall short in specific programming required to develop the ability to start, stop, change direction, get up, get down and other tasks that soldiers have to perform in full spectrum operations

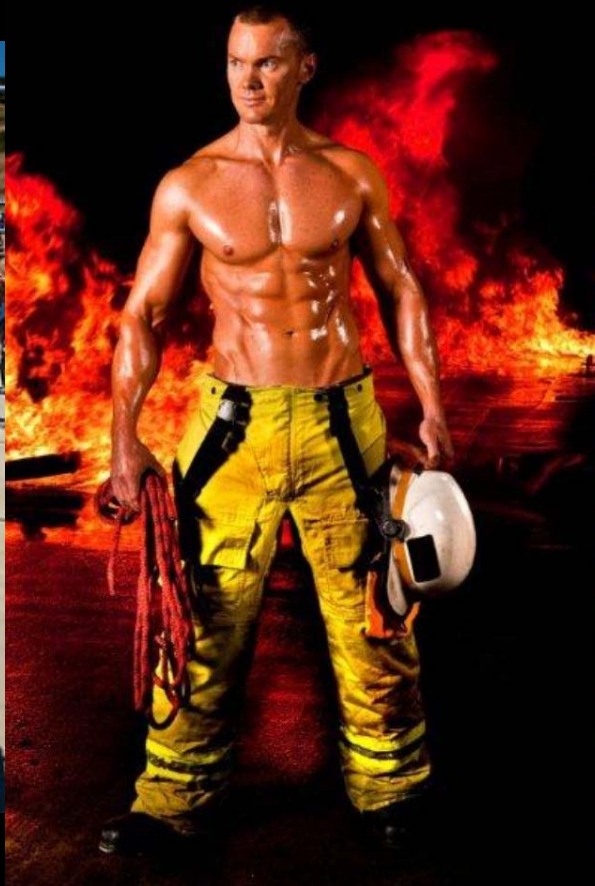


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Logic for exercise choices/order?



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Logic for exercise choices/order?

- Missing elements required of tactical personnel (eg load carriage)
 - To maintain load carriage capability it is recommended that a LC specific session every 7-14 days (Orr, et al. 2010, Knapik et al., 2012).
 - Some evidence that other forms of conditioning do have limited value



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Led to CHAMP/ACSM High-Intensity Training Workshop

- Noted benefits
 - ECPs are often multifaceted programs utilising various forms of resistance and cardiovascular training exercises.
 - The training pace and exercise intensities of ECPs are challenging.
 - ECPs provide a variety of training activities that war-fighters BELIEVE will promote better combat readiness.

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Led to CHAMP/ACSM High-Intensity Training Workshop

- **Noted detractors**
 - Certain concepts of ECPs violate recognised and scientifically validated conditioning frameworks (like periodisation, rest and recovery periods);
 - Frameworks that have a strong level of evidence supporting their use.
 - Do not include all the conditioning needs of a soldier (e.g. LC).
 - Do not consider individual influences (Unit PT, workday fatigue).
 - Promote speed of movement in competitive circumstances and coupled with fatigue from minimal rest and maximal effort can lead to early technical movement failure, increased stress and strain on the body and the risk of a debilitating injury.

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Recommendations for use

- Determine whether the gains (specific to the overarching training goal) from the ECP will outweigh the risks
- Introduce ECP slowly to new participants (regardless of fitness)
- Individualise supplemental conditioning (job specific)
- Ensure suitable rest and recovery
 - * Ensure recovery before any arduous work task/event
- Monitor closely for overtraining signs and symptoms (as you should for any program)

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Recommendations for use

- When designing a unit/stations (or an individual's) physical conditioning program, YOU must consider:
 - What is the measurable goal of the program (aesthetics is a diet and fitness industry construct NOT an operational one)
 - How can I effectively AND safely condition personnel to meet these goals (risk v benefit)
- Make the personnel you are training fit and capable because of their training not in spite of it
- Think about the long term impact of this training on the member (soldier/officer for life)

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